AMENDED CLAIMS

[Received by the International Bureau on 16 November 2004 (16.11.04): original claims 1, 8, 13, 29, 35, 47 and 52 are cancelled ; original claims 2, 4, 6, 7, 11, 26, 30, 39, 46 and 51 are amended ; the remaining claims are retained unchanged. (16 pages)]

1. (DELETED)

2. (AMENDED)

A drive unit, comprising:

a first magnetic material and a second magnetic material, in which one magnetic material is provided to the fixed side and the other magnetic material is provided on the drive side; and

drive means for driving the magnetic material on the driving side against the magnetic material on the fixed side by generating a magnetic action between said first magnetic material and said second magnetic material as a result of providing a frequency signal to said first magnetic material or second magnetic material;

wherein one magnetic material is disposed such that the direction above the magnetic line it generates intersects or is parallel with the direction above the magnetic line generated by the other magnetic material; and

wherein said drive unit has a PLL circuit provided to a frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU.

3. A drive unit according to claim 2, wherein said drive means controls said frequency signal such that the positive electrode and negative electrode of the magnetic line generated by the magnetic material provided with said frequency signal are alternately switched.

4. (AMENDED)

A drive unit, comprising:

a first magnetic material and a second magnetic material, in which one magnetic material is provided to the fixed side and the other magnetic material is provided on the drive side; and

drive means for driving the magnetic material on the driving side against the magnetic material on the fixed side by generating a magnetic action between said first magnetic material and said second magnetic material as a result of providing a frequency signal to said first magnetic material or second magnetic material;

wherein one magnetic material is disposed such that the direction above the magnetic line it generates intersects or is parallel with the direction above the magnetic line generated by the other magnetic material;

wherein said drive unit has a PLL circuit provided to a frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU;

wherein said drive means controls said frequency signal such that the positive electrode and negative electrode of the magnetic line generated by the magnetic material provided with said frequency signal are alternately switched; and

wherein said drive means is able to arbitrarily switch the frequency of said frequency signal with a frequency generation circuit.

5. A drive unit according to claim 3, wherein said magnetic material to be driven is fixed to an oscillating body with an oscillation structure.

6. (AMENDED)

A drive unit, comprising:

a first magnetic material and a second magnetic material, in which one magnetic material is provided to the fixed side and the other magnetic material is provided on the drive side; and

drive means for driving the magnetic material on the driving side against the magnetic material on the fixed side by generating a magnetic action between said first magnetic material and said second magnetic material as a result of providing a frequency signal to said first magnetic material or second magnetic material;

wherein one magnetic material is disposed such that the direction above the magnetic line it generates intersects or is parallel with the direction above the magnetic line generated by the other magnetic material;

wherein said drive unit has a PLL circuit provided to a frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU;

wherein said drive means controls said frequency signal such that the positive electrode and negative electrode of the magnetic line generated by the magnetic material provided with said frequency signal are alternately switched; and

wherein said magnetic material to be driven is fixed to an operation unit, as an operational structure, provided to the fixed side of the other magnetic material.

7. (AMENDED)

A drive unit, comprising:

a first magnetic material and a second magnetic material, in which one magnetic material is provided to the fixed side and the other magnetic material is provided on the drive side; and

drive means for driving the magnetic material on the driving side against the magnetic material on the fixed side by generating a magnetic action between said first magnetic material and said second magnetic material as a result of providing a frequency signal to said first magnetic material or second magnetic material;

wherein one magnetic material is disposed such that the direction above the magnetic line it generates intersects or is parallel with the direction above the magnetic line generated by the other magnetic material;

wherein said drive unit has a PLL circuit provided to a frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU;

wherein said drive means controls said frequency signal such that the positive electrode and negative electrode of the magnetic line generated by the magnetic material provided with said frequency signal are alternately switched;

wherein said drive means is able to arbitrarily switch the frequency of said frequency signal with a frequency generation circuit; and

wherein said frequency generation circuit is provided to the fixed side of said first magnetic material.

8. (DELETED)

9. A drive unit according to claim 6, wherein the operation unit with said magnetic material to be driven fixed thereon uses a kinetic energy source in combination with a sound source.

10. A drive unit according to claim 6, wherein the operation unit with said magnetic material to be driven fixed thereon retains a liquid substance, and sprays said liquid substance when said magnetic material is driven.

11. (AMENDED)

A drive unit, comprising:

a first magnetic material disposed on the fixed side;

a second magnetic material and a third magnetic material disposed on the operational side; and

drive means for driving said second magnetic material and third magnetic material by generating a magnetic action between said first magnetic material and said second magnetic material and said third magnetic material, respectively, by providing a frequency signal to said first magnetic material;

wherein said second magnetic material and third magnetic material are provided facing each other with said first magnetic material in the center, and disposed such that the directions above the magnetic lines generated respectively intersect against the direction above the magnetic line generated by said first magnetic material;

wherein said drive unit further comprises control means for respectively controlling the magnetic lines generated by said second

magnetic material and third magnetic material as a result of providing an electronic signal to said second magnetic material and third magnetic material, respectively; and

wherein a control means respectively controls the positive electrode and negative electrode of the magnetic lines generated by said second magnetic material and third magnetic material in accordance with the control of the frequency signal by said drive means.

12. A drive unit according to claim 11, wherein said drive means controls said frequency signal such that the positive electrode and negative electrode of the magnetic line generated by the magnetic material provided with said frequency signal are alternately switched.

13. (DELETED)

14. A drive unit according to claim 12, wherein said drive means is able to arbitrarily switch the frequency of said frequency signal with a frequency generation circuit.

15. A drive unit, comprising:

a coil fixed to a substrate;

a magnet provided in the vicinity of the hollow portion of said coil such that the direction above the magnetic line it generates intersects with the direction above the magnetic line generated by said coil; and

a drive circuit for driving said coil;

wherein, when an AC signal having a frequency lower than an audio frequency is applied to said coil from said drive circuit, said magnet and a diaphragm having said magnet mounted thereon oscillate as one,

and, when an AC signal of an audio frequency band is applied to said coil from said drive circuit, said magnet oscillates and produces sound.

16. A portable terminal device having a drive device according to claim 15 built in its housing,

wherein, when an AC signal having a frequency lower than an audio frequency is applied to said coil from said drive circuit, a sensible oscillation is generated externally via said housing, and, when an AC signal of an audio frequency band is applied to said coil from said drive circuit, sound or beeping is generated externally.

17. A drive mechanism, comprising:

a plurality of magnetic bodies disposed facing each other; and

a drive circuit for applying a polar signal which generates force for mutual repulsion or attraction between said magnetic bodies;

wherein a set formed of said plurality of magnetic bodies is supported with a fulcrum, and said drive circuit drives said magnetic body around said fulcrum in an inclining manner; and

said set of magnetic bodies is structured as the driving source by being connected to a drivee.

18. A drive mechanism according to claim 17, wherein said set of magnetic bodies is formed of a permanent magnet and a coil, and said drive circuit is structured to apply a drive current to said coil.

19. A drive mechanism according to claim 17, wherein said set of magnetic bodies is formed from a plurality of coils.

20. A drive mechanism according to claim 19, wherein a plurality of coils disposed facing each other via a permanent magnet.

21. A drive mechanism according to any one of claims 17 to 20, wherein said drive circuit applies a frequency signal to said magnetic body and oscillates said magnetic body.

22. A drive mechanism according to claim 21, wherein said magnetic body is reciprocated in an arc around said fulcrum.

23. A drive mechanism according to any one of claims 17 to 22, wherein a plurality of said sets of magnetic bodies is mutually connected via said fulcrum.

24. A drive mechanism according to claim 17, wherein said drivee is a wing of a flight simulation driver.

25. A drive mechanism according to claim 17, wherein said drivee is a leg of a walking simulation driver.

26. (AMENDED)

A drive unit according to claim 3, wherein a PLL circuit is provided to said frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU;

wherein a drive mechanism, comprises:

a plurality of magnetic field generation means;

means for making the magnetic fields generated by said magnetic field generation means mutually interfere; and

a drivee to be driven with at least one behavior of said plurality of magnetic field generation means;

wherein said drive mechanism comprises said drive unit having a PLL circuit provided to a frequency generation circuit to enable a facilitated setting of an arbitrary frequency with a CPU, and an

interference means for generating an electronic signal that periodically changes the electromagnetic polarity of said induced magnetic field.

27. A drive mechanism according to claim 26, wherein said magnetic field generation means includes means for generation an induced magnetic field, and said interference means is capable of supplying to said induced magnetic field generation means an electronic signal that is able to control the electromagnetic polarity of said induced magnetic field means.

28. A drive mechanism according to claim 27, wherein said magnetic field generation means includes a permanent magnetic field generation means, and said interference means is for changing said permanent magnetic field with said induced magnetic field.

29. (DELETED)

30. (AMENDED)

An inductive acoustic conversion device, wherein a plurality of magnetic bodies is disposed to face each other in a plane, said magnetic bodies are oscillated relatively, at least one magnetic body is structured from a voice coil and an oscillation material, said voice coil exists outside the oscillation area of said oscillation material, and further comprising a drive circuit for supplying a drive signal to said voice coil; and

wherein said inductive acoustic conversion device further comprises frequency modulation means for supplying to a drive circuit a frequency-modulated PWM control wave.

31. An inductive acoustic conversion device according to claim 30, wherein the other magnetic body is structured from a permanent magnet.

32. An inductive acoustic conversion device according to claim 30, wherein said voice coil is formed in a circle, and said oscillation material is disposed in the internal diameter area thereof.

33. An inductive acoustic conversion device according to claim 31, wherein said voice coil is provided on the side of one polar face of said permanent magnet so as to generate magnetic force on the outside magnetic line of said permanent magnet, and said oscillation material is provided to the internal diameter area of said coil.

34. An inductive acoustic conversion device according to claim 31, wherein said voice coil is provided on both polar faces, respectively, of said permanent magnet so as to generate magnetic force on the outside magnetic line of said permanent magnet, and said oscillation material is provided to the internal diameter area of said coil.

35. (DELETED)

36. A device according to claim 35, wherein said frequency modulation means frequency-modulates a basic frequency signal with a sound source frequency signal wave, and supplies this modulated wave as said PWM control wave to said drive circuit.

37. A device according to claim 35, wherein said basic frequency signal is structured from a saw-tooth wave with a frequency, and this saw-tooth wave is output from a PLL control circuit.

38. A device according to claim 36, wherein the frequency of said basic frequency signal is changed for moving the resonance point of

said oscillation material.

39. (AMENDED)

A drive mechanism of a micro mirror in a digital micro mirror device, comprising:

a micro mirror support mechanism; and

a drive circuit for supplying a drive signal to said support mechanism;

wherein said support mechanism comprises a set formed from a plurality of magnetic bodies, said drive circuit supplies a frequency signal to at least one of said magnetic bodies, and said support mechanism inclines said micro mirror by making the magnetic fields from said magnetic bodies interfere with each other; and

wherein said drive circuit comprises PWM control means for executing, under the PWM control, the supply of a drive signal to said magnetic bodies.

40. A mechanism according to claim 39, wherein said set of magnetic bodies is formed from a permanent magnet and a coil.

41. A mechanism according to claim 40, wherein said permanent magnet supports said micro mirror, said coil is disposed so as to face said permanent magnet, and said drive circuit supplies said frequency signal to said coil.

42. A mechanism according to any one of claims 39 to 41, wherein the supporting axis of said micro mirror is structured with one of said magnetic bodies.

43. A mechanism according to claim 39 or claim 40, wherein the

supporting axis of said micro mirror is provided outside the area in which said magnetic bodies are disposed facing each other.

44. A mechanism according to claim 40, wherein said permanent magnet and said coil are disposed in a direction such that their mutual magnetic line directions intersect.

45. A mechanism according to claim 40, wherein said permanent magnet and said coil are disposed in a direction such that their mutual magnetic line directions become parallel.

46. (AMENDED)

A drive mechanism, comprising:

a set comprising a plurality of magnetic bodies;

means for supplying a frequency signal to said set; and

means for producing movement caused by the attraction/repulsion between said magnetic bodies;

wherein said movement is the driving source of said drive mechanism; and

wherein red (R), blue (B) and green (G) reflection areas are formed on said micro mirror, said drive circuit supplies a drive signal to said magnetic body for each R, B and G, and, in correspondence to said drive signal, and the reflective surface of the corresponding colors of said micro mirror inclines toward the reflecting direction.

47. (DELETED)

48. A drive mechanism employing a set formed from a plurality of magnetic bodies as the driving source comprising a drive circuit, wherein a drive signal composed of a frequency signal from said drive

circuit is supplied to at least one of said magnetic bodies, said magnetic bodies are made to incline between said magnetic bodies by generating interference in the magnetic field between said magnetic bodies, said drive circuit is capable of providing a duty ratio of said drive signal by comprising PWM control means and controlling the inclination of said magnetic body with said duty ratio, and this inclination is employed as the drive of a drivee.

49. A drive mechanism according to claim 48, wherein said drivee is a display device or a reflection means of a display apparatus.

50. A drive mechanism according to claim 49, wherein said reflection means is a micro mirror of a digital micro mirror device.

51. (AMENDED)

A power output device, comprising:

a hollow cylindrical body to which a coil is wound;

a pillar-shaped permanent magnet inserted into the hollow portion of said hollow cylindrical body; and

a crank mechanism for converting the relative reciprocating motion of said hollow cylindrical body and said permanent magnet to a rotational motion of a rotational axis;

wherein said hollow cylindrical body forms a magnetic circuit between said permanent magnet inserted in the hollow portion thereof with the drive pulse signal supplied to said coil, alternately generates magnetic repulsion and magnetic attraction between said hollow cylindrical body and said permanent magnet in accordance with the polarity of the alternately changing drive pulse signal, and thereby

makes said hollow cylindrical body and said permanent magnet conduct a reciprocating motion, and coverts said reciprocating motion into a rotational motion of a rotational axis via said crank mechanism;

wherein said power output device further comprises:

a phase synchronization circuit for adjusting the oscillation frequency of a voltage control oscillator so as to synchronize with the pulse signal output in synchronization with the rotation of said rotational axis;

a drive signal generation unit for generating a drive pulse signal corresponding to the phase difference between a reference signal and the oscillation frequency of said voltage control oscillator; and

a CPU for performing parameter control of the oscillation frequency of said voltage control oscillator and/or the oscillation frequency of said reference signal.

52.(DELETED)

53. A power output device according to claim 51, further comprising:

detection means for detecting the rotational speed of said rotational axis; and

power supply means for supplying to said coil the kinetic energy corresponding to the rotational speed of said rotational axis detected by said detection means, and the electrical energy equivalent to the difference of the kinetic energy corresponding to the rotational speed of the rotational axis requested by the CPU.

54. A power output device according to claim 51, further comprising:

a phase synchronization circuit for outputting a pulse signal

which changes upon tracking the bounce frequency of said reciprocating motion;

a phase comparator for outputting a signal corresponding to the phase difference of said reference signal and pulse signal; and

a drive signal generation unit for generation said drive pulse signal based on the output signal of said phase comparator.

55. A power output device according to claim 51, further comprising:

a phase synchronization circuit for adjusting the oscillation frequency of said voltage control oscillator to the integral multiple of the bounce frequency of said reciprocating motion;

a phase comparator for outputting a signal corresponding to the phase difference of the oscillation signal of said voltage control oscillator adjusted to 1/integral number and a prescribed reference signal; and

a drive signal generation circuit for generating said drive pulse signal based on the output signal of said phase comparator.

56. A power output device according to claim 55, further comprising:

a position sensor for detecting the detection signal when said hollow cylindrical body reaches the top dead center or bottom dead center; and

an electrode switching unit for generating a polarity signal setting forth the polarity of said excitation pulse signal upon determining whether said hollow cylindrical body is moving from the top dead center to the bottom dead center, or whether it is moving from the bottom dead center to the top dead center;

wherein said drive signal generation unit generates said drive pulse signal based on said polarity signal.

57. A power output device according to claim 56, wherein said electrode switching unit sets a phase lag of said polarity signal against said detection signal in accordance with the rotational speed of said rotational axis.

58. A power output device according to any one of claims 55 to 57, further comprising control means for adjusting the rotational speed of said rotational axis by adjusting the dividing value of said voltage control oscillator or the oscillation frequency of said reference signal.

59. A power output device according to any one of claims 51 to 58, further comprising an energy regeneration mechanism for regenerating said reciprocating motion into electrical energy with the back electromotive force generated in the coil by the relative reciprocating motion of said hollow cylindrical body and said permanent magnet.

60. A power output device according to any one of claims 51 to 59, wherein said crank mechanism is provided to both ends of either said hollow cylindrical body or said permanent magnet.

61. A power output device according to any one of claims 51 to 60, wherein a balance wheel for retaining inertial energy is provided to the drive system of said rotational motion.

62. A display apparatus comprising the drive mechanism according to claim 50.